OVERWEIGHT IN SCHOOLCHILDREN AND ASSOCIATION WITH PHYSICAL ACTIVITY AND PARENTAL HABITS

SOBREPESO EM ESCOLARES E ASSOCIAÇÃO COM A PRÁTICA DE ATIVIDADE FÍSICA E HÁBITOS PARENTAIS

SOBREPESO EN ESCOLARES Y ASOCIACIÓN CON LA PRÁCTICA DE ACTIVIDAD FÍSICA Y HÁBITOS PARENTALES

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ABSTRACT

Introduction: Excess weight in childhood and adolescence is an important health problem that tends to persist in adulthood. Among the causes of this increase there appears to be a consensus on emphasizing physical activity as an excellent strategy to achieve better weight control, and on considering some models of parental practices essential for the acquisition of healthy habits in young people. Objective: To study the role of physical activity (undertaken by children and their parents) in the prevalence of overweight in Spanish schoolchildren. Methods: We studied 1687 schoolchildren aged between 13 and 17 years and 2335 mothers and fathers. The body mass index (BMI) of each child was calculated and information was collected on the physical activity level of the children and the parental physical activity level and BMI. Results: The schoolchildren analyzed have a higher prevalence of excess weight than the national average, significantly associated with age, sex, and excess weight of the mother, showing no significant association with the level of physical activity, but instead with the parental level of physical activity. Discussion: As predictive variables for excess weight in schoolchildren we found sex, age and excess weight of the mother. Conclusion: There is a prevalence of obesity and overweight in the sample of schoolchildren studied, and this is significantly associated with age rather than with physical activity. This prevalence is also significantly associated with the excess weight of the parents and with the level of physical activity of the father, which appears to confirm the influence of family characteristics and household physical activity in excess weight among schoolchildren. ***Level of Evidence I; Diagnostic studies - Investigating a diagnostic test.***

Keywords: Obesity; Overweight; Physical activity; Healthy eating habits.

RESUMO

Introdução: O excesso de peso na infância e adolescência constitui-se em um importante problema de saúde que tende a persistir na idade adulta. Entre as causas desse aumento parece existir consenso em destacar a prática de atividade física como uma excelente estratégia para conseguir melhor controle do peso e em considerar alguns modelos de práticas parentais fundamentais para a aquisição de hábitos saudáveis nos jovens. Objetivo: Estudar o papel da atividade física própria e de seus pais na prevalência do excesso de peso em estudantes espanhóis. Métodos: Analisaram-se 1687 estudantes entre 13 e 17 anos e 2335 pais e mães. Calculou-se o índice de massa corporal (IMC) de cada criança e foram coletadas informações referentes ao nível de atividade física das crianças e ao nível de atividade física e IMC dos pais. Resultados: Os estudantes analisados apresentam prevalência de excesso de peso superior à média nacional associando-se significativamente com a idade, o sexo e o excesso de peso da mãe, não mostrando associação significativa com o nível da sua prática de atividade física e sim com a prática de atividade física dos pais. Discussão: Como variáveis preditivas para o excesso de peso nos estudantes encontramos o sexo, a idade e o excesso de peso da mãe. Conclusão: Há prevalência de obesidade e sobrepeso na amostra de estudantes analisada, e isso associa-se significativamente à idade e não à prática de atividade física. Essa prevalência também está associada significativamente ao excesso de peso dos pais e com o nível de atividade física do pai, o que parece confirmar a influência das características familiares e sua prática de atividade física no excesso de peso escolar. ***Nível de Evidência I; Estudos diagnósticos - Pesquisa de um exame para diagnóstico.***

Descritores: *Obesidade; Sobrepeso; Atividade física; Hábitos alimentares saudáveis.*

RESUMEN

Introducción: El exceso de peso en la infancia y la adolescencia se constituye en un importante problema de salud que tiende a persistir en la edad adulta. Entre las causas de ese aumento parece existir consenso en destacar la práctica de actividad física como una excelente estrategia para conseguir mejor control del peso y en considerar algunos modelos de prácticas parentales fundamentales para la adquisición de hábitos saludables en los jóvenes. Objetivo: Estudiar el papel de la actividad física propia y de sus padres en la prevalencia del exceso de peso en estudiantes españoles. Métodos: Se analizaron 1687 estudiantes entre 13 y 17 años y 2335 padres y madres. Se calculó el índice de masa corporal (IMC) de cada niño y fueron colectadas informaciones referentes al nivel de actividad física de los niños y al nivel de actividad física e IMC de los padres. Resultados: Los estudiantes analizados presentan prevalencia de exceso de peso superior al promedio nacional asociándose significativamente con la edad, el sexo y el exceso de peso de la madre, no mostrando asociación significativa con el nivel de su práctica de actividad física y sí

con la práctica de actividad física de los padres. Discusión: Como variables predictivas para el exceso de peso en los estudiantes encontramos el sexo, la edad y el exceso de peso de la madre. Conclusión: Hay prevalencia de obesidad y sobrepeso en la muestra de estudiantes analizada, y eso se asocia significativamente a la edad y no a la práctica de actividad física. Esa prevalencia también está asociada significativamente al exceso de peso de los padres y con el nivel de actividad física del padre, lo que parece confirmar la influencia de las características familiares y su práctica de actividad física en el exceso de peso escolar. ***Nivel de Evidencia I; Estudios diagnósticos - Investigación de un examen para diagnóstico.***

Descriptores: *Obesidad; Sobrepeso; Actividad física; Hábitos alimenticios saludables.*

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INTRODUCTION

The World Health Organization (WHO) has warned[1] that obesity is affecting an increasing proportion of the world's population, and the increase in the prevalence of overweight and obesity in children and adolescents is concerning. The IDEFICS Project[2], conducted from 2006 to 2012, reported that one out of every five children has excess weight. Furthermore, there is a higher prevalence of childhood excess weight in southern European countries, with one of the highest rates being reported in Spain.

In Spanish children and adolescents, the prevalence of excess weight is 27.9% (18.3% and 9.6%, respectively). In the geographic region assessed in our study, the prevalence of obesity and overweight (34.6%) is clearly more than the average Spanish prevalence, with one in three children having excess weight at increasingly younger ages.[2]

Obesity in childhood and adolescence leads to major complications[3], and the evidence clearly indicates that childhood obesity tends to persist into adulthood[4]. There are several causes of obesity; thus, the expression most used to define the origin of obesity is "obesogenic surroundings", which means that the origins of the current obesity epidemic are fundamentally social.[5]

There is a consensus on physical activity being an excellent strategy to achieve energy balance and weight control[6,7] and to consider models of parental practices as fundamental for the acquisition of healthy habits in the young through physical activity.[8,9]

This study aimed to determine the prevalence of obesity and overweight in a population of Spanish schoolchildren and to analyze the effect of physical activity and family environment on excess weight.

MATERIALS AND METHODS

Sample

We conducted a descriptive and cross-sectional study with 22 educational centers that participated in the Center Sports Project within the Plan Proxecta of the Xunta de Galicia during 2013–2014.[10] A total of 1697 schoolchildren (873 girls and 824 boys) aged 13–17 years, 1078 fathers, and 1257 mothers participated in the study.

Procedure

The study followed the standards of the Helsinki Declaration of 1975 and was approved by the Research Ethics Committee of the University of A Coruña (UDC EC-10/2013). Participation was voluntary; the legal guardians signed an informed consent form; and confidentiality of the information obtained was guaranteed, consistent with the current laws. The registration forms and questionnaires were anonymized for the evaluation of data and dissemination of results.

The body mass index (BMI) of the students was calculated using the weight and height measurements. Weight was measured twice using a digital scale (model SECA 861) with an accuracy of 0.1 kg. Height was measured twice, using a stadiometer (model SECA 222), to the nearest millimeter. The body weight status of the participating students (low weight, normal weight, overweight, and obesity) was then determined using the data from the study by Cole et al.[11]

The variables related to physical activity were calculated from a self-administered International Physical Activity Questionnaire (IPAQ) in the Spanish short version validated for adolescents (IPAQ-A).[12] The IPAQ-A consists of five questions on the frequency, duration, and intensity of physical activity performed in the last 7 days, as well as time spent walking and time spent sitting during a weekday.

According to these data, the students were categorized into three groups according to the number of hours of weekly physical activity proposed by the WHO: very slightly or not active (between 0 and 7 hours), active (between 7 and 10 hours), and very active (more than 10 hours). To assess the effect of the family environment, the parents' BMI and their physical activity levels were assessed through the IPAQ using self-reported data.

Statistical analysis

A descriptive analysis of the variables was performed to evaluate the characteristics of the sample studied. The chi-square test was used to study the relationship between variables. The association between the variables was modeled through multinomial logistic regression. As part of this last analysis, the adjusted odds ratios (ORs) were calculated with 95% confidence intervals (CIs). The significance level was $p < 0.05$. All analyses were performed with the SPSS statistical analysis package version 22.0.

RESULTS

Differences in physical characteristics according to sex were significant only for weight ($p = 0.023$), height ($p = 0.003$), and BMI ($p = 0.045$). The prevalence of excess weight among the students was 41.2% (overweight 27.6% and obesity 13.6%) (Table 1), with a slightly higher but non-significant prevalence in boys (41.8%) than in girls (40.5%).

Regarding physical activity (Table 1), only 33.1% of the sample could be classified as active or very active according to the hours dedicated to some physical activity, in contrast to 66.9% categorized as slightly or very slightly active. Male schoolchildren were significantly more active (44%) than female schoolchildren (22.8%). The proportion of active schoolchildren decreased significantly with age, from 35.4% at 13 years to 23.9% at 17. Schoolchildren tended to overestimate their level of physical activity, as 64.4% considered themselves active or very active compared with 33.1% in real terms.

Table 2 shows a significant increase in the prevalence of excess weight with age, which was greater in boys than in girls (Table 2).

There were no significant associations between BMI and physical activity level in either the total number of students or in either sex. These data appear contradictory (Table 1) as 49.6% of children with overweight and 23.9% of children with obesity were found in the group of active or very active participants. Girls with excess weight were less active than boys.

The relationships between the BMI of the students and the BMI of the father and the mother (Table 3) were significant overall and by sex.

The relationship of students' BMI with the level of parental physical activity (Table 3) was significant only for the fathers and not for the mothers. The physical activity level of the schoolchildren was significantly associated only with the physical activity of the mothers and not with that of both parents together (Table 4).

The predictive variables for excess weight (obesity and overweight) in the total number of schoolchildren analyzed were sex (OR = 0.83 [95% CI = 0.73-0.95], $p < 0.009$), age (OR = 1.32 [95% CI = 1.13-1.53], $p < 0.001$), and excess weight of the mother (OR = 1.95 [95% CI = 1.44-2.63], $p < 0.001$). The other variables studied (physical activity of children, parental physical activity, and excess weight of the father) did not correlate significantly with excess weight of children. Age (OR = 1.38 [95% CI = 1.11-1.72], $p < 0.003$) and physical activity (OR = 0.75 [95% CI = 0.61-0.92], $p < 0.007$) were also predictive variables in boys, and age (OR = 1.29 [95% CI = 1.06-1.58], $p < 0.01$) and excess weight of the mother (OR = 3.23 [95% CI = 2.13-4.91], $p < 0.000$) are predictive variables in female schoolchildren.

Table 1. Descriptive data, weight prevalence, and level of physical activity in the sample.

	Total n = 1697	Boys n = 873	Girls n = 824
Physical characteristics, mean ± SD			
Age (years)	14.28 ± 1.06	14.29 ± 1.07	14.27 ± 1.05
Weight (kg)	54.34 ± 11.41	53.01 ± 1.60	55.73 ± 12.21
Height (m)	1.62 ± 0.09	1.60 ± 0.07	1.64 ± 0.10
BMI (kg/m^2)			
Children	20.52 ± 3.71	20.59 ± 4.05	20.45 ± 3.31
...Parents	---	27.01 ± 3.63	25.07 ± 4.008
Weight prevalence (%)			
Low birth weight	24.0	24.4	23.5
Normal	34.8	35.0	34.7
Overweight	27.6	27.0	28.3
Obesity	13.6	13.5	13.5
Level of physical activity (%)			
Slightly active	66.9	77.3	55.9
Active	16.7	13.6	20.0
Very active	16.4	9.2	24.0
Perception of physical activity level (%)			
Slightly active	37.3	37.6	33.6
Active	34.4	34.4	34.4
Very active	30.0	19.5	40.0

SD: standard deviation; BMI: body mass index.

Table 2. Prevalence of excess weight (overweight plus obesity) by sex and age.

	Prevalence of excess weight (%)		
	Global n = 1697	Female n = 873	Male n = 824
p-value	0.000**	0.021*	0.001*
Age (years)			
13	33.2	32.3	34.2
14	38.1	39.2	37.1
15	45.5	43.8	44.5
16	54.2	54.1	55.9
17	65.8	55.0	76.2

*$p < 0.05$; **$p < 0.001$.

Table 3. Prevalence of excess weight with parental BMI and activity level.

	Prevalence of excess weight (%)					
	Total		Female		Male	
	Overweight	Obesity	Overweight	Obesity	Overweight	Obesity
BMI						
Father						
p-value	0.000**		0.003*		0.001*	
Overweight	45.3	34.1	47.5	24.3	42.9	33.3
Obesity	25.6	36.6	24.6	31.9	26.8	39.7
Mother						
p-value	0.001*		0.001*		0.000**	
Overweight	37.5	9.3	30.1	34.8	30.1	34.8
Obesity	35.0	26.4	8.8	23.2	8.8	23.2
Physical activity						
Father						
p-value	0.015*		0.017*		0.322	
Active	25.7	11.2	26.3	9.6	25.1	12.8
Not active	26.7	15.2	25.6	14.2	28.2	16.5
Mother						
p-value	0.209		0.323		0.293	
Active	27.7	12.0	28.4	12.1	29.8	15.2
Not active	26.6	14.2	23.8	13.3	26.9	11.9

BMI: body mass index. *$p < 0.05$; **$p < 0.001$.

Table 4. Physical activity level in relation to parental physical activity level.

Parental physical activity level	Activity level prevalence (%)					
	Total		Female		Male	
	Not active	Active	Not active	Active	Not active	Active
Mother						
p-value	0.017*		0.023*		0.161	
Very slightly active	32.2	27.6	41.4	37.4	21.4	17.4
Slightly active	36.2	38.7	36.3	38.1	36.2	39.4
Active	16.9	16.5	15.5	12.5	18.5	20.8
Very active	14.7	17.2	6.8	12.0	23.9	22.4
Father						
p-value	0.364		0.133		0.597	
Very slightly active	32.9	25.6	43.8	35.1	20.7	14.7
Slightly active	36.5	36.6	37.5	35.9	35.4	38.5
Active	15.3	18.6	10.5	18.9	20.7	18.3
Very active	15.3	19.2	8.2	11.0	23.2	28.6

*$p < 0.05$; **$p < 0.001$.

DISCUSSION

The prevalence of excess weight in the population studied (41.1%) was much higher than that reported previously.[7] The prevalence was higher than the 25.5% reported for Spanish children aged between 14 and 17 years,[13] 20.9% for secondary students in southern Spain,[14] 26.2% for adolescents from the Canary Islands, 31.9% for children and adolescents in southeastern Spain, 25.5% for Brazilian adolescents,[15] and 29.9% for Mexican adolescents.[16] However, the prevalence in the present study was slightly lower than the 57.5% prevalence reported in a population of 13-year-old schoolchildren from Chile[17] and the 43% prevalence of obesity and overweight in Mexican children reported by Safdie et al.[18] Another study, conducted in the same region where the present study was performed, reported a 38.15% prevalence of excess weight,[19] a discrepancy that may be attributed to the time duration between the studies. The schoolchildren studied had a higher prevalence of excess weight than those in other areas of Spain, which coincides with published data in adults in the same areas.

Most studies report an increase in excess weight with age, similar to our data. The higher prevalence observed in boys than in girls is common

in Spain and other similar populations, such as in Mexico,[17] although there have been reports of a higher or similar prevalence in girls.[20] This may correspond to the influence of individual determinants related to the onset of puberty, a time of major changes in BMI.

Regarding physical activity, the proportion of active students in our study (32%) is similar to that presented by Hallal et al.,[21] who reported that 80.3% of the children and adolescents had less than 60 minutes of moderate to vigorous physical activity per day, but is considerably less than the 71.5% of active or very active Spanish children reported previously[22], probably because of differences in the criteria used to classify physical activity. Greca et al. report similar data in Brazilian students, with 13.4% being active and 86.5% being inactive.

Boys are more active than girls, in line with the Spanish, Brazilian, Mexican, American, and European studies[24]. Male predominance may be due to the different role models in our society that restrict girls and women from participating in sports. Although there has been some progress, these results highlight the importance of encouraging more participation in sports activities among young girls.

The relationship between BMI and physical activity was not significant, and the results do not agree in general with those found in the literature suggesting that the prevalence of overweight and obesity was lower among children and adolescents with a better level of physical condition or those who participate in sports activities several days per week, compared with more sedentary children.[25] Multifactorial and direct intervention studies also report that a decrease in BMI is associated with an increase in physical activity.

In our study, 30.3% of the children with excess weight were active or very active compared with 36.4% of the children with normal weight. Several studies have reported significant differences in the number of hours of physical activity per week and the prevalence of obesity. Villagran et al.[26] obtained conflicting results, similar to our results. We believe that the diagnosis of overweight using only BMI in children is not precise and may be limited by the inability to differentiate between fat mass and lean mass; for example, a child athlete without a high fat percentage can be classified as overweight or a child having a high fat percentage can be classified as having a suitable weight. Another factor to be taken into account but not analyzed in this study is the increase of sedentary habits that can counteract the physical activity.

We should also consider that BMI does not discriminate with respect to the distribution of body fat. Thus, it is recommended to use waist circumference measured at the abdominal level as an anthropometric parameter to measure central fat because of its possible relation with the metabolic syndrome.[27]

We emphasize that the association between the BMI of the students and the perception of their level of physical activity was significant (Table 3). No published data have been found that allow a discussion or explanation for this apparent inconsistency.

A correlation between the parents' and child's BMI was found, and the proportion of students with excess weight was higher among those whose father (39.9%) and especially mother (49.3%) had excess weight. Villagrán et al.[27] reported that in overweight children, 68.6% of the parents and 38% of the mothers were also overweight. A more significant association was noted with the BMI of the mother. We also believe that, in addition to genetics, the lifestyles of both parents, especially the mother and her role in the child's nutritional habits may explain these findings.

Only a few studies have reported a relationship between the parents' physical activity level and the BMI of schoolchildren compared with studies that reported a positive relationship between the parents' physical activity and that of their children. In our study, we found a significant relationship between overweight in children and the physical activity level of the father. A similar relationship was also found by Piéron and Ruiz-Juan,[8] who noted that this may be because the father is the most active parental model. The variables we identified that are predictive for excess weight among schoolchildren confirm the results obtained in previous studies.[27,28]

CONCLUSION

There was a high prevalence of obesity and overweight in the sample of schoolchildren studied, which was associated significantly with age and not with physical activity. The obesity and overweight in children were also significantly associated with excess weight of the parents and with the physical activity level of the father, which seems to confirm the influence of family characteristics and their physical activity on schoolchildren's excess weight. We can conclude that in order to understand excess weight in children, it is important to have a model that takes into account the most relevant variables of the current obesogenic lifestyle, such as physical activity, diet, and family habits. Studies such as ours allow us to establish that specific strategies for preventing overweight must involve not only the individual subject but also the social and institutional environment in which children coexist and develop. The limitations of the study are related to sample size, methods used for measuring variables, and exclusion of variables of interest. The cross-sectional design makes it difficult to establish cause-and-effect relationships, and therefore, longitudinal studies should be conducted in the future. Finally, data collection through a questionnaire may have resulted in various biases.

This work is integrated into a broader research whose objective is to analyze the habits of physical activity, health and lifestyle of Galician schoolchildren. This project has, among other objectives, that the participating centers be units that promote healthy physical activity. As a first step of this evaluation, an updated study is carried out on the prevalence of excess weight and its relationship with other variables that may have direct incidence, highlighting the practice of physical activity and variables related to parents.

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